

Improving Data for Mekong Water Resources Management

July, 2018



Photo: Narut Jareon

There is consensus and legitimate need for the development of a new initiative that could strengthen the capacity of Mekong countries and existing institutions in improving water resources data management to inform policy and decision making. The new initiative must have clear and responsive objectives that complement existing initiatives and truly fill gaps and needs at country and regional level.

This draft discussion paper provides an updated situation of, and capacity needs for, water resources data management in the Lower Mekong region, and guidance for potential opportunities under the new initiative.

I. Why Mekong water data needs to be improved?

Quality and sufficient water data is fundamental to knowledge generation that allows stakeholders to understand their river systems and water resources better. At a regional level, water resource planning requires transparent shared quality water data and information that can be the basis for building trust.

However, “water data” is a wide-encompassing concept, often technical and multi-dimensional. The varied typology and scale of water data require extensive resources and expertise to collect, process and analyze. Great progress has been achieved by the *Mekong River Commission (MRC) Information System*, and other regional initiatives and programs, but technical and policy barriers persist. Given the vast and complex ecosystem coupled with additional challenges from rapid development and climate change, the Mekong Basin consistently demands considerable support from stakeholders and experts to keep collecting data and building living knowledge.

There have been chronic incidents and issues in the Mekong Basin that reflect the lack of data and knowledge sharing and communication between key stakeholders.

- No effective warning on unusual fluctuating flows resulting from upstream development. This happens in both dry and flood season in parts of the Lower Mekong stretch (and its tributaries) causing damage to communities, businesses, farmers and wildlife habitat in Lao PDR and Thailand;
- Unsuccessful project development stakeholder consultation due to the lack of essential data and information, sensible impact assessment results and trust building; Knowledge base of water resource use at local and basin-widescale and dependency of the populations in the Lower Mekong Basin on these, especially of the poor, is still largely missing;
- There are demands for contesting scientific research, studies and assessments of Mekong water resources, but fundamental to the same sets of shared standard data (which many are still unavailable), i.e. hydrological and sediment impact assessment, climate change and project development impact assessment, water quality monitoring, socio-economic and economic assessment, etc.
- For the Irrawaddy and Salween Basin, Myanmar, water data and knowledge of the river basins are still largely inadequate. Development of flood warning systems based on adequate accumulative local data and technical capacity is one of the national priorities in disaster preparedness and management.

II. Existing water data initiatives and challenges

2.1 The Mekong River Commission

The MRC is the only inter-governmental river basin organization of the Lower Mekong Basin, and is central to regional water resources data coordination and sharing. The MRC has an official mandate to coordinate water data between its member countries, namely Cambodia, Lao PDR, Thailand and Viet Nam.

The MRC Procedures for Data and Information Exchange and Sharing (PDIES) are the agreed rules and regulations charging the MRC and its Member Countries to collect, coordinate, exchange and share Mekong water-related data and information for their agencies and for public use, central to the MRC-Information System, managed by the MRC Secretariat, located in Vientiane, Lao PDR.

Under the PDIES, there are 12 categories of water-related data that Member Countries are required to share with the MRC: (1) Water Resources, (2) Topography, (3) Natural Resources, (4) Agriculture, (5) Navigation and Transport, (6) Flood Management and Mitigation, (7) Infrastructure, (8) Urbanization and Industrialization, (9) Environment and Ecology, (10) Administrative boundaries, (11) Socio-economy, and (12) Tourism. ***The Procedures for Notifications, Prior Consultation, and Agreement (PNPCA)*** also assigns the Member Countries to submit and share a list of significant development projects, and hold prior consultations to discuss the transboundary impacts on the mainstream Mekong before any commitment is made to proceed.

However, in practice, the only main areas of data and information that has been routinely and consistently shared and exchanged between the MRCS and its Member Countries (and to the public to a lesser extent) are Water Resources (1), Flood Management and Mitigation (6), and Environment and Ecology (9)¹. This data plays a vital role for the MRC and Lower Mekong regional water resources management. The key products and services of the MRC regarding the use of data from these categories include:

- 1) The MRC public website and its *MRC Data and Information Service Portal* webpage <http://portal.mrcmekong.org/index>.
- 2) Scenario and impact assessment studies for regional policy planning in different subject areas such as SEA Study in 2010, Basin Development

¹ Most of the primary data in hydrology within category (1) and (9) is collected by 49 automatic telemetry stations installed across the Lower Mekong Basin, operated by the Mekong-Hydro Meteorological Cycle Observation System, or Mekong HYCOS Project. The MRC collects sedimentation data from 17 sediment monitoring stations under the Discharge Sediment Monitoring Project. Environment and Ecology (9) data, is collected by specific activities and programs agreed upon and supervised by the MRCS and shared by the Member Countries.

Plan – Cumulative Impact Assessment (CIA) Study in 2012, MRC Assessment on Flood, Droughts and Climate Studies 2014, and MRC Council Study 2018.

3) Overwhelming number of study reports and working papers, and series of publications in different Lower Mekong languages related to water and sediment biodata, national climate change adaptation, water quality, Catch and Culture, and Annual Mekong Flood Report.

The MRC website, and its MRC Data and Information Service Portal webpage, is a key conduit for disseminating the above data and information to the public. It requires a registration for external data users. Only MRCS Staff, National Mekong Committee (NMC) and their line agencies can access the full data free of charge. The most well-known datasets and information that is shared through the website include:

- **Mekong Hydrology and River Monitoring:** Reports Mekong flows and hydrology, updated daily during the flood season, and weekly during the dry season. Hourly real-time HYCOS monitoring is said to be in preparation;
- **Flood forecasting:** Reports flood forecasts in three Mekong zones – upper, middle and lower – from 24 HYCOS stations, including two located in Yunnan Province, China.² The MRCS also sends this forecast to the Member Countries directly; and
- **MRC Master Catalogue:** Allows data users to search for, and download for free, a variety of datasets; some such as meteorology, hydrology, land use and GIS require purchasing from MRC.

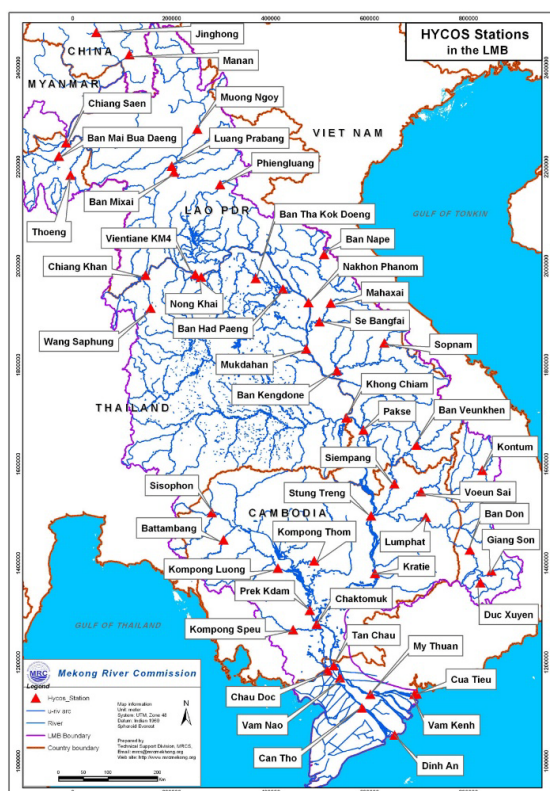


Figure 1: Automatic telemetry stations under Mekong HYCOS project, Credit: MRCS

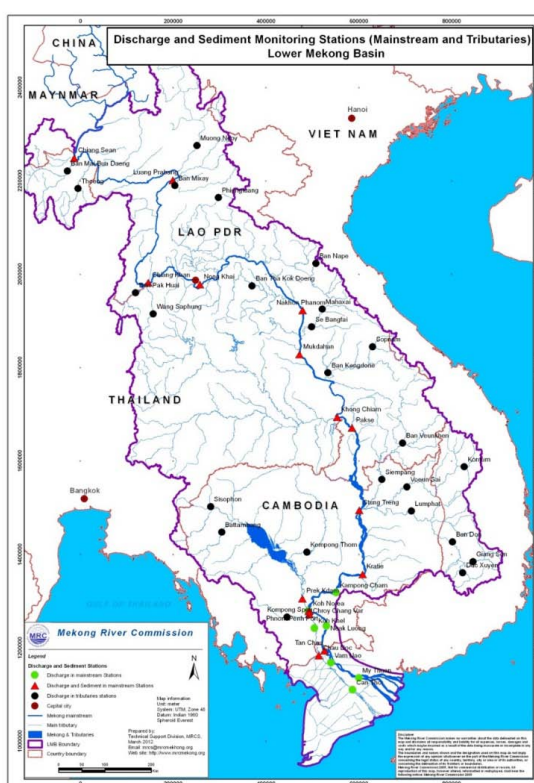


Figure 2: Discharge Sediment Monitoring Stations, Credit: MRCS

² The Flood Forecasting page allows data users to click on any icon of HYCOS stations to show the river cross section image with actual water level, as well as observed water level in the last seven days and last four months.

To access other categories, the MRCS is required to submit an official request indicating a clear scope of activity or program, objectives and deliverables to the relevant National Mekong Committee (NMC) to review. In the case that the data is not yet available, the concerned program will discuss with the NMC (s) on a data collection protocol, assuming funds are available and granted. This needs to be agreed by all Member Countries and the MRCS, including sharing of the data publicly.

2.2 Other existing initiatives

There are some other key regional initiatives that support the Mekong region in building professional and institutional capacity in river basin and disaster management which include improving water data, directly or indirectly.

The Lancang Mekong River Cooperation – the Lancang Mekong Water Resources Cooperation Center (LMWRCC), launched in March 2017, started by building capacity around water-related innovation techniques and practices i.e. flood control, landscape and hazard management, through study visits between the Lower Mekong Countries (LMCs) and China. The LMWRCC has since established a “Joint Working Group on Water Resources” between the Chinese and the Lower Mekong Governments to set up regional and bi-lateral cooperation frameworks on transboundary water management, especially in hydropower, flood and drought, and climate change mitigation and management.

The Australian Aid Program (Department of Foreign Affairs and Trade), Australian Greater Mekong Water Resources Program has played a key role, and is a champion, in supporting regional institutions and all the five Lower Mekong Governments – through regional organizations such as the World Bank (WB), International Finance Corporation, the Asian Development Bank (ADB), MRC, and non-governmental organizations – to promote and strengthen transboundary water governance, technical capacity and sustainable water development. The Australian Aid program also works with the Government of Myanmar and the National Water Resources Committee, through the Australian Water Partnership, to build the capacity around national river basin management and the Myanmar Hydro-Informatics Center.



The World Bank - MRC Integrated Water Resources Management (IWRM) Capacity Building Program works with the MRC in addressing transboundary and bilateral cooperation through select water issues that promote sustainable livelihoods and inclusive decisions. The WB also works with Cambodian, Lao, and Vietnamese governments in building IWRM capacity of national agencies including developing respective national water resources data centers. The WB Ayeyarwady Integrated River Basin Management Project works with the Myanmar Government to build capacity of relevant agencies and institutions to develop a river basin development master plan and decision support system.

The ADB Greater Mekong Sub-region (GMS) Flood and Drought Risk Management and Mitigation Project works to support the Laotian, Cambodian, and Vietnamese governments to install hydro-met infrastructure to enhance flood forecasting at river basin and national scale and build capacity of agencies and local communities in disaster risk management.

The Agence Francaise de Developpement (AFD) works with the MRC to support the establishment and expansion of Mekong-HYCOS stations for more accurate flood and drought forecasting.

The MRC-GIZ Cooperation Program works together with the MRC in developing and implementing instruments for testing and improving the sustainability of hydropower projects. MRC-GIZ is also promoting the exchange of experiences between various river basin organizations involved in sustainable hydropower development, as well as developing basic and advanced training measures on sustainable hydropower.

USAID-SERVIR Mekong brings earth-orbiting satellite, geospatial and other advanced technologies to support the LMCs in developing, and analyzing, data and information on climate risks, water resources management, land use, etc.

Open Development Mekong is a data contributor website on socio-economic, land-use, development, environment, and water etc. of the five LMCs. The website is interactive-based and open for partners and outsiders to share and exchange data and information.

2.3 Regional gaps and opportunities

Has data and information been shared efficiently and benefited the Lower Mekong Region? Does the data have good quality?

Different data users require different types and levels of quality data. Flood experts may require real-time series hydrology, meteorology and spatial data, etc. for their immediate flood risk modelling assessments, but climate scientist researchers may require the data with thirty-year historical records for long term future projections. Local communities will seek reliable real-time flood data to keep them informed about possible flood risks in the short-term. While decision makers may only require a user-friendly factsheet that has captured all essential information to build their understanding and make informed decisions within a limited timeframe.

This paper has delved into a few main datasets/categories but there are many others such as climate, sediment loads, groundwater, fisheries, development projects,

data sharing infrastructure, etc. Regardless, despite challenges and difficulties, it is undeniable that there have been great strides made in building a data and information sharing system for the Lower Mekong region. That said, there is still much work to be done to build on this foundation to further build trust and transparency among stakeholders and improve the well-being of the Lower Mekong communities. Below are some identified gaps and potential opportunities for existing and new initiatives to leverage.

- **Hydrological and flood forecast data** for the MRC, which is mostly available on the Mekong mainstream, is confirmed to be of varying benefit to the MRC Member Countries. Viet Nam, the most downstream country, has confirmed that flood forecast data helps their agencies assess routine flood levels for the Mekong delta. Cambodia still heavily relies on the flood information from the HYCOS stations, most of which are being repaired and upgraded. Lao PDR and Thailand, as the upper stream countries, may not benefit as much from such data. However, the two HYCOS stations in Yunnan province across the border report discharge flows only in the flood season, but during the dry season the unreported discharge flows could still be damaging to riverine communities in Lao PDR and Thailand due to the drastic fluctuation levels. In addition, efficient means of communication between the MRC, national agencies and local communities during flood (and drought) events need to be developed as a priority to make full use of the data by concerned stakeholders and affected groups. Problems to do with timeliness of flood forecast data reporting and delivery, and difficulties in accessing data have been highlighted.³ For example, the MRC flood forecast

webpage is not updated regularly due in part to lack of human resources to manage it, analyze and digitize the data, and/or technical failure of certain HYCOS stations.

OPPORTUNITY: Maintain the existing HYCOS stations and establish new ones throughout the Basin.

- **Land use spatial data** has not been updated since 2008⁴, and in some cases since 2003. Updated spatial data is believed to be produced randomly by many other development and aid projects, and largely by Thailand and Viet Nam. Custodian rights issues in sharing those datasets can be problematic while analyzing and formatting datasets from different sources can be a very time-consuming task.

OPPORTUNITY: Work with the MRC, Country Members and development partners in introducing remote sensing technology to develop and update land-use spatial data for the Lower Mekong Basin.

- **Water quality data** reported in the MRC website has not been updated since 2015. The water quality parameters are also not shown (i.e. dissolved oxygen, biochemical oxygen demand, pH, etc). In other cases, monitoring stations may not actually be well situated to gather water quality data regularly around key sites, such as the Xayaburi hydropower project.

OPPORTUNITY: Participatory monitoring of macroinvertebrates (i.e. biomonitoring) as a cost-effective proxy for water quality to promote local participation.

^{3,4} Draft Discussion Paper - Upgrading Regional Data Management as of July 1, 2017

- **Water resources based socio-economic and livelihood data** is essential in building an understanding of how the Mekong water resources are used, especially by the poor and vulnerable. National census data that has been shared with the MRC by Member Countries still largely lack this detail. Compounding this, the MRC Social Impact Monitoring and Vulnerability Assessment has been conducted on a very small scale and at locations not fully representative of the Mekong Basin in general, while its data collection process is rather complex.

OPPORTUNITY: Design and use of a mobile application that provides real-time information and alerts on hydrological monitoring and flood forecast, allowing the MRC to efficiently and effectively expand its reach.

- **Web-based data sharing platform and impact assessment tool:** Many monitoring and impact assessment tools have been introduced by the MRC and other entities to date, but they are generally geared towards technical experts.

OPPORTUNITY: With the support of partners, the MRC, could conduct an extensive but cost-effective water resources-based socioeconomic and livelihood survey across the Basin.

OPPORTUNITY: An innovative web-based impact assessment tool that allows stakeholders to quickly assess different types of impacts and scenarios related to hydrology, environment, socioeconomic, and climate change could be introduced. Such a tool could play a role in the dissemination and exchange of data from data providers and coordinators providing a tangible incentive for the public in terms of learning.

- **User-friendly web-based and disaster warning mobile application tool:** While the MRC and its Member Countries have been trying to reach out to different groups of stakeholders through field visits and national and local consultations and activities, the MRC's user-friendly website is a key medium for dissemination of data and information, and as such should be improved.



2.4 National gaps and opportunities

While the capacity gap in water data management among the five LMCs is extensive, all of them share certain similar challenges. This section presents these challenges with the aim being to spur discussion on how new initiatives could help countries close the gap.

- **Large and complex national water governance structure:** Every LMC faces this challenge, with multiple agencies that collect, use, and share (or do not share, as the case may be) water-related data and information via many channels, often at the same time sowing confusion and discord. For example, Thailand alone has more than 35 agencies that collect, use, and share water-related data making it almost impossible to effectively coordinate. Nevertheless, all the countries recognize this challenge and have been working to reform elements of their water governance structure. Cambodia has been actively working with the MRC and development partners in strengthening technical coordination and capacity of the Cambodia NMC, Department of Hydrology and River Works, and Department of Meteorology. Lao PDR has recently enacted a new Water Law which addresses the need for the development of the national water data center to be supported by the WB, ADB, and AFD. Myanmar is still at an early stage in building its water resources data management capacity but also shares the concern regarding coordination among many different agencies. Myanmar has been working with key development partners as Australian Aid, the WB, and the Netherlands in strengthening the coordination capacity of the National Water Resources Committee (NWRC) and Hydro-Informatics Center. Thailand has recently reformed its national water governance structure and established the National Water Resources Planning Office (NWRPO), under the auspices of the Prime Minister's Office, as the one-stop service in national water management and is developing the National Big Data Program central to national water data coordination across the country.



- **Water data collection process and methodology:** All the LMCs, except Thailand, lack the financial and technical capacity to effectively collect hydrology, flow, weather, and land use data. Most still rely on manual data collection resulting in poor data quality and dissemination. Though automatic telemetry technologies have been extensively supported by the WB, ADB, MRC, and ADF unfortunately many stations have been decommissioned due to lack of maintenance, technical capacity, and proper internet connectivity. Thailand uses its own telemetry technology and license which is comparably more reliant.
- **Groundwater and water quality monitoring:** Groundwater and water quality data and information at national and tributary levels (not to mention the mainstream Mekong) has been found to be very inefficient or non-existent in certain countries such as Cambodia, Lao PDR and Myanmar. While the rapid development and climate change threats are mounting for the LMCs, the governments still lack the technical and financial capacity in groundwater and water quality monitoring. This calls for building long-term institutional capacity in these disciplines.



Photo: Nook Pattanon